10.3b Probability Name _____
Adv. Alg. A

Problems 1-11 involve finding the probability that a certain kind of permutation or combinations is selected at random.

1. The varsity croquet team, 4 boys and 8 girls, travels to an out-of-town game. Their coach, Miss Teak, will take 7 of them in her station wagon. If they get into cars at random, what is the probability that Miss Teak's car has
    a) 2 boys and 5 girls?
    b) all girls?
    c) all boys?
    d) Beck Hansen and Kanye West, two of the boys?

2. Charlie Brown has 13 socks in his drawer, 7 blue and 6 green. He selects 5 socks at random. What is the probability that he gets
    a) 2 blue and 3 green?
    b) 3 blue and 2 green?
    c) 2 blue and 3 green, or 3 blue and 2 green?
    d) the one sock that has a hole in it?

3. A 6-letter permutation is selected at random from the letters NIMBLE. What is the probability that
    a) the third letter is I and the last letter is B?
    b) the second letter is a vowel and the third is a consonant?
    c) the second and third letters are both vowels?
    d) the second letter is consonant and the last letter is E?
    e) the second letter is consonant and the last letter is L?

4. A 5-letter permutation is selected at random from the letters GRATE. What is the probability that
    a) the second letter is T and the last letter is G?
    b) the second letter is a vowel and the third is a consonant?
    c) the second and third letters are both consonants?
    d) the second letter is consonant and the last letter is E?
    e) the second letter is consonant and the last letter is R?

5. Nine people try out for the nine positions on a baseball team.
    a) In how many ways could the positions be filled if there are no restrictions on who plays which position?
    b) In how many ways could the positions be filled if Fred must be the pitcher, but the other eight can take any positions?
    c) If the positions are selected at random, what is the probability that Fred will be the pitcher?
    d) What is the percent probability in part c?

6. Eleven girls try out for the eleven positions on the varsity soccer team.
    a) In how many ways could the eleven positions be filled if there are no restrictions on who plays which position?
    b) In how many ways could the positions be filled if Mabel must be the goal keeper?
    c) If the positions are selected at random, what is the probability that Mabel will be goal keeper?
    d) What is the percent probability in part c?

7. Nine people try out for the nine positions on the baseball team, as in Problem 5. If the players are selected at random for the positions, what is the probability that
    a) Fred, Mike, or Joe is pitcher?
    b) Fred, Mike, or Joe is pitcher, and Sam or Paul is first baseman?
    c) Fred, Mike, or Joe is pitcher, and Sam or Paul plays first base, and Bob is catcher?

8. Jackson who is 3 years old, tears the labels off all 10 of the soup cans on his mother's shelf. His mother knows that there were 2 cans of tomato soup and 8 cans of vegetable. She selects 4 cans at random.
    a) What is the probability that exactly 1 of the 4 cans is tomato?
    b) What is the probability that at least 1 of the 4 cans is tomato?
    c) What is the probability that *none* of the 4 cans is tomato?
    d) What relationship exists between the answers to part b and c?

9. Eleven girls try out for the eleven positions on the varsity soccer team, as in Problem 16. If the players are selected at random for the positions, what is the probability that
    a) Mabel, Sue, or Diedra is goal keeper?
    b) Mabel, Sue, or Diedra is goal keeper, and Alice or Phyllis is center forward?
    c) Mabel, Sue, or Diedra is goal keeper, Alice or Phyllis is center forward, and Bea is left fullback?
10. An ordinary deck of playing cards has 4 suits, with 13 cards of each suit. In many games, each of the 4 players is dealt 13 cards at random.
    a) What is the probability that such a hand has
        i. exactly 5 spades?
        ii. exactly 3 clubs?
        iii. exactly 5 spades and 3 clubs?
        iv. exactly 5 spades, 3 clubs, and 2 diamonds?

    b) Which is more probable, getting all 4 aces or getting all 13 cards of the same suit? Justify your answer.

11. Ten first-graders line up for a fire drill.
    a) How many possible arrangements are there?
    b) How many of these arrangements have Calvin and Phoebe next to each other? (Clue: Arrange *nine* things, the Calvin-Phoebe pair and the eight other children. Then arrange Calvin and Phoebe.)
    c) If they line up at random, what is the probability that Calvin and Phoebe will be next to each other?